

Claims

- [c1] 1. An expandable and collapsible structural module, comprising:
- at least three strut pairs, each strut pair including a first strut having a first end and a second end and a second strut having a first end and a second end, the first strut and the second strut being pivotably connected to each other at a point between the first and second ends of the first strut and the second strut, respectively, the at least three strut pairs being arranged end to end such that the first end of a first strut of any strut pair of the at least three strut pairs is pivotably attached to the second end of a second strut of a preceding strut pair of the at least three strut pairs and the first end of any second strut of the at least three strut pairs is pivotably attached to the second end of a first strut of the preceding strut pair, at least three corners being defined by connected ends of the at least three strut pairs; and
- at least three legs pivotably connected at respective ones of the at least three corners to the connected ends of the at least three strut pairs, at least one of the at least three legs being a telescoping leg.
- [c2] 2. The structural module as set forth in claim 1, further comprising at least one tension member disposed between ends of two or more of the at least three legs.

- [c3] 3. The structural module as set forth in claim 2, wherein the at least three legs are vertical legs and at least one tension member is disposed between upper ends of two or more of the at least three legs.
- [c4] 4. The structural module as set forth in claim 2, wherein the at least three legs are vertical legs and at least one tension member is disposed between lower ends of two or more of the at least three legs.
- [c5] 5. The structural module as set forth in claim 2, wherein the at least one tension member includes a cable.
- [c6] 6. The structural module as set forth in claim 2, wherein the at least one tension member includes a foldable strut member.
- [c7] 7. The structural module as set forth in claim 6, wherein the foldable strut member includes a stop for preventing the foldable strut member from passing a line defined by ends of two legs between which the foldable strut is disposed.
- [c8] 8. The structural module as set forth in claim 2, wherein the at least one tension member prevents the structural module from expanding beyond a predetermined expanded position.
- [c9] 9. The structural module as set forth in claim 2, wherein at least one of the at least one tension member includes at least one roller mounted thereon.

- [c10] 10. The structural module as set forth in claim 2, wherein at least one of the at least one tension member is disposed between legs disposed at opposite ends of a single strut pair.
- [c11] 11. The structural module as set forth in claim 2, wherein at least one of the at least one tension member is disposed between legs disposed at opposite ends of different strut pairs.
- [c12] 12. The structural module as set forth in claim 2, further comprising hubs for pivotably attaching ends of the struts of the at least three strut pairs, ends of the at least three legs, and ends of the at least one tension member.
- [c13] 13. The structural module as set forth in claim 1, further comprising hubs for pivotably attaching ends of the struts of the at least three strut pairs and ends of the at least three legs.
- [c14] 14. The structural module as set forth in claim 1, wherein all of the at least three legs are telescoping legs.
- [c15] 15. The structural module as set forth in claim 1, wherein each of the at least one telescoping leg includes a first portion and a second portion, a combined length of the first portion and the second portion being greater than a length of any strut of the at least three strut pairs.
- [c16] 16. The structural module as set forth in claim 1, comprising four strut pairs and four legs, the structural module being movable

between an expanded condition in which the structural module has a substantially cube shape and a folded condition in which the struts of the four strut pairs and the four legs are substantially parallel.

- [c17] 17. The structural module as set forth in claim 1, comprising three or more connected tension members, the three or more tension members each having a first end attached proximate a respective one of the at least three legs and a second end attached to second ends of the other ones of the three or more connected tension members.
- [c18] 18. The structural module as set forth in claim 1, wherein the first and second struts of each strut pair of the at least three strut pairs are pivotably connected to one another at centerpoints of the first and second struts.
- [c19] 19. The structural module as set forth in claim 1, wherein the first and second struts of each strut pair of the at least three strut pairs are pivotably connected to one another at points removed from centerpoints of the first and second struts.
- [c20] 20. An expandable and collapsible structure, comprising:
a plurality of connected expandable and collapsible structural modules, each module comprising at least three strut pairs, each strut pair including a first strut having a first end and a second end and a second strut having a first end

and a second end, the first strut and the second strut being pivotably connected to each other at a point between the first and second ends of the first strut and the second strut, the at least three strut pairs being arranged end to end such that the first end of a first strut of any strut pair of the at least three strut pairs is pivotably attached to the second end of a second strut of a preceding strut pair of the at least three strut pairs and the first end of any second strut of the at least three strut pairs is pivotably attached to the second end of a first strut of the preceding strut pair, at least three corners being defined by connected ends of the at least three strut pairs, and at least three legs pivotably connected at respective ones of the at least three corners to the connected ends of the at least three strut pairs, at least one of the at least three legs being a telescoping leg.

[c21] 21. The structure as set forth in claim 20, wherein at least two of the plurality of connected modules are connected such that the two modules share two legs and one strut pair.

[c22] 22. The structure as set forth in claim 20, further comprising at least one tension member disposed between ends of two or more legs.

[c23] 23. The structure as set forth in claim 22, wherein two or more connected modules are connected to each other so that they extend in a first direction and at least one tension member is

disposed between ends of two or more legs and extends in a second direction substantially perpendicular to the first direction.

[c24] 24. The structure as set forth in claim 23, wherein at least one of the at least one tension member includes at least one roller mounted thereon.

[c25] 25. The structure as set forth in claim 20, wherein, for at least one module of the plurality of connected modules, the first and second struts of each strut pair of the at least three strut pairs are pivotably connected to one another at centerpoints of the first and second struts.

[c26] 26. The structural module as set forth in claim 20, wherein, for at least one module of the plurality of connected modules, the first and second struts of each strut pair of the at least three strut pairs are pivotably connected to one another at points removed from centerpoints of the first and second struts.

[c27] 27. An expandable and collapsible conveyor arrangement, comprising:

at least one expandable and collapsible structural module, each module comprising at least three strut pairs, each strut pair including a first strut having a first end and a second end and a second strut having a first end and a second end, the first strut and the second strut being pivotably connected to each other at a point between the first and second ends

of the first strut and the second strut, the at least three strut pairs being arranged end to end such that the first end of a first strut of any strut pair of the at least three strut pairs is pivotably attached to the second end of a second strut of a preceding strut pair of the at least three strut pairs and the first end of any second strut of the at least three strut pairs is pivotably attached to the second end of a first strut of the preceding strut pair, at least three corners being defined by connected ends of the at least three strut pairs, and at least three legs pivotably connected at respective ones of the at least three corners to the connected ends of the at least three strut pairs, at least one of the at least three legs being a telescoping leg; and
at least one tension member disposed between ends of two or more legs.

[c28] 28. The conveyor arrangement as set forth in claim 27, wherein two or more connected modules are connected to each other so that they extend in a first direction and at least one tension member is disposed between ends of two or more legs and extends in a second direction substantially perpendicular to the first direction.

[c29] 29. The conveyor arrangement as set forth in claim 28, wherein a second group of two or more connected modules are connected to each other so that they extend in the second direction and at

least one tension member is disposed between ends of two or more legs of the second group and extends in the first direction substantially perpendicular to the first direction.

[c30] 30. The structure as set forth in claim 27, further comprising a plurality of protruding members for defining a path along which a conveyed article may be conveyed.

[c31] 31. The structure as set forth in claim 30, wherein the protruding members include hubs for pivotably attaching ends of the struts of the at least three strut pairs, ends of the at least three legs, and ends of the at least one tension member.

[c32] 32. The structure as set forth in claim 27, wherein at least one of the at least one tension member includes at least one roller mounted thereon.

[c33] 33. A hub assembly for pivotably connecting four struts, comprising:
a central axis; and
four connection points arranged in a plane around and perpendicular to the central axis for pivotably connecting four respective struts, each strut having a longitudinal axis, each connection point being disposed relative to the central axis so that the longitudinal axis each of the four struts to be connected is offset from the central axis.

[c34] 34. The hub assembly as set forth in claim 33, further comprising

four cable connection points, each cable connection point being associated with a corresponding one of the four connection points.

[c35] 35. The hub assembly as set forth in claim 33, further comprising an opening extending along the central axis for attaching a leg strut.

[c36] 36. The hub assembly as set forth in claim 35, further comprising protruding members at least partially defining the opening and extending parallel to the central axis.

[c37] 37. The hub assembly as set forth in claim 33, wherein each connection point is adapted to connect struts having the same lateral dimension, each connection point being offset by a distance equal to at least half of the lateral dimension of the struts to be pivotably connected to the connection point.

[c38] 38. The hub assembly as set forth in claim 33, wherein different ones of the four connection points are adapted to connect struts having the different lateral dimensions, each connection point being offset by a distance equal to at least half of the lateral dimension of the struts to be pivotably connected to the connection point.